Special Subjects of the Department of Astronomical Science

Field	Subject Code	Subject	Credit	Content of subject	
Infrared Astronomy	20DASa01	Introduction to Optical/Infrared Telescope	2	A principle of optical and infrared telescopes is presented as well as the basics of observation such as spectroscopy and photometry.	T. Usuda S. Ohya J. Nomaru S. Miyazaki
	20DASa02	Introduction to Optics	2	Basics of optics are lectured. Topics will be aberration, and the methods to evaluate a optical system.	K. Sekiguchi S. Hayashi Y. Hayano
	20DASa03	Optical/Infrared Observation Instruments	2	Principles of various detectors in optical and infrared observations are lectured.	N. Ohashi N. Gouda H. Takami S. Hayashi S. Miyazaki
	20DASa04	Optical/Infrared Astronomy Ⅰ	2	An overview the present status of observational astronomy is presented for various astronomical objects in the hierarchy.	T. Usuda I . Iwata
	20DASa05	Optical/Infrared Astronomy Ⅱ	2	Current methods of optical observation of stars are lectured as well as the methodology to know the physical quantities of stars.	W. Aoki Y. Takeda
	20DASa06	Optical/Infrared Astronomy Ⅲ	2	Lecture on interstellar matter and star formation process.	N. Ohashi T. Takata
	20DASa07	Optical/Infrared Astronomy Ⅳ	2	Lecture on galactic astronomy, especially on the observational aspects of galaxies and the relation to their physical state. We will discuss the problem both from observation and theory.	M. Tanaka
	20DASa08	Optical/Infrared Astronomy Ⅴ	2	Lecture on objects of solar system. Observational methods to obtain physical quantities are lectured.	J. Watanabe M. Soma
	20DASa09	Precision Measurement Method	2	Lecture on the precision measurement using interferometry.	N. Gouda R. Flaminio
	20DASa10	Optical/Infrared Astronomy Seminar Ⅰ	2	Seminar on the optical/infrared astronomy.	All faculties of optical/infrared astronomy group
	20DASa11	Optical/Infrared Astronomy Seminar Ⅱ	2	Seminar on the optical/infrared astronomy.	All faculties of optical/infrared astronomy group
Radio Astronomy	20DASb01	Introduction to Radio Telescope	2	Lecture on the principle of radio telescope, the design and production, and basics of its control.	H. Matsuo K. Shibata
	20DASb02	Introduction to Radio Observation System	2	Lecture on radio receivers, which includes low-temperature techniques and digital processing.	Y. Asaki S. Asayama H. Matsuo
	20DASb03	Introduction to Instruments of Radio Astronomy	2	Lecture on principles of various detectors in radio observations.	S. Iguchi Y. Uzawa H. Matsuo
	20DASb04	Radio Astronomy Ⅰ	2	Lecture on an overview of the present status of observational astronomy at radio wavelengths for various astronomical objects in the hierarchy.	N. Ohashi S. Kameno R. Kawabe S. Asayama D. Espada
	20DASb05	Radio Astronomy Ⅱ	2	Lecture on an overview of the present status of observational astronomy at radio wavelengths for various astronomical objects in the hierarchy.	T. Hasegawa M. Honma K. Nakanishi
	20DASb06	Radio Astronomy Ⅲ	2	Observation methods towards radio sources such as molecular clouds, data analysis methods, including the radiative transfer, to derive physical quantities on such sources, and physical and chemical properties so far obtained will be lectured.	H. Kobayashi K. Tatematsu M. Fukagawa

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Radio Astronomy	20DASb07	Radio Astronomy Ⅳ	2	Lecture on observational aspects of galaxies, which includes the physical state of galaxies, evolution and formation of galaxies.	S. Iguchi H. Honma D. Iono
	20DASb08	Radio Astronomy Ⅴ	2	In this class, I will provide general view on chemical and molecular evolution in interstellar clouds, protoplanetary disks and circumstellar clouds, and will describe their evolution mechanisms under various physical conditions.	M. Ohishi
	20DASb09	Radio Interferometry	2	Principle of radio interferometers, necessary observational technology and methods of data reduction are lectured.	S. Iguchi S. Kameno
	20DASb10	Radio Astronomy Special Lecture	2	Lecture on Very-Long-Baseline-Interferometer. Principles and methods of data reduction are lectured.	H. Kobayashi K. Shibata
	20DASb11	Radio Astronomy Seminar Ⅰ	2	Seminar on radio observation and its instruments.	All faculties of radio astronomy group
	20DASb12	Radio Astronomy Seminar Ⅱ	2	Seminar on radio observation and its instruments.	All faculties of radio astronomy group
Common Base	20DASc01	General Relativity	2	Lecture on the general relativity.	N. Gouda Y. Aso
	20DASc02	Gravitational Dynamical System Ⅰ	2	Basics of celestial mechanics, fundamental points of dynamical system, orbits of celestial bodies are lectured.	H. Yoshida
	20DASc03	Gravitational Dynamical System Ⅱ	2	Spin motion of celestial bodies, perturbation theory and numerical method of dynamical system are lectured.	T. Fukushima
	20DASc04	Solar System Astronomy	2	Spin motion and deformation of planets are lectured based on geophysical methods.	K. Matsumoto
	20DASd01	Nuclear Astrophysics	2	The lecture aims to study the stellar evolution, supernova explosion and galactic chemical evolution based on understanding the elementary processes in these macroscopic phenomena in the universe.	T. Kajino
	20DASd02	Solar/Stellar Physics	2	Interior structures of our sun and stars and their evolution are lectured.	T. Sekii Y. Takeda H. Hara
	20DASd03	Cosmic Plasma Physics Ⅰ	2	Surface activity and atmospheric structure of our sun and other stars are lectured.	R. Kano Y. Suematsu Y. Hanaoka H. Hara
	20DASd04	Cosmic Plasma Physics Ⅱ	2	Observations of the structure of stellar atmosphere by UV, X-ray, and radio wavelengths are lectured.	Y. Suematsu H. Hara
	20DASd05	Astrophysics Ⅰ	2	The lecture aims to study both theoretical and observational aspects of the evolution of the early universe, the roles of particle and nuclear processes there, and the formation and evolution of cosmic large scale structure in modern cosmology.	T. Kajino
	20DASd06	Astrophysics Ⅱ	2	Stellar system, structure and evolution of galaxies are lectured.	K. Tomisaka
	20DASd07	Astrophysics Ⅲ	2	Lecture on interstellar matter, planetary systems and star formation.	E. Kokubo K. Tomisaka F. Nakamura
	20DASe08	Astronomical Data Reduction	2	Lectures on astronomical data reduction, including image processing, data archive and related software.	R. Kawabe K. Sekiguchi M. Ohishi T. Takata
	20DASe09	Statistics for Astronomy	2	The course introduces statiscal methods of analyses that are necessary in interpreting data in various fields of astronomy. While astrnomical applications are the goal, the course starts from the basics.	R. Kano J. Kosugi
	20DASe03	Introduction to Numerical Method	2	The basic knowledge of some numerical techniques used in astronomy.	K. Tomisaka T. Fukushima

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Common Base	20DASe04	Simulation Astronomy	2	Lecture on method of simulation for various researches of astronomy.	K. Tomisaka
	20DASe05	Science Communication	2	Based on various examples of astronomy, the way of research outcomes to contribute to the public (public outreach) is lectured.	J. Watanabe H. Agata
	20DASe06	Common Basic Astronomies Seminar Ⅰ	2	Seminar on database astronomy, solar/cosmic plasma, and theoretical astronomy.	All faculties of common basic astronomies group
	20DASe07	Common Basic Astronomies Seminar Ⅱ	2	Seminar on database astronomy, solar/cosmic plasma, and theoretical astronomy.	All faculties of common basic astronomies group
	20DASe10	Extrasolar planetary science	2	The course introduces observational and data-analysis methods used in exoplanet research, as well as its latest results.	T. Kotani T. Nakajima
	20DASe11	Planetary system formation	2	The course covers theoretical and observational studies of planetary system formation, starting from the basics but introducing the latest topics as well.	E. Kokubo T. Kotani T. Nakajima
	20DASe12	Gravitational Wave Astronomy	2	Lecture on gravitational wave (GW) astronomy. GW theory is introduced. GW detectors and very recent GW detections (2015-2017) are presented.	M. Leonardi
Common	20DASf01	Introduction to Astronomical Instruments	2	Principles of observational instruments for various wavelengths are lectured from the physical basics.	H. Takami Y. Suematsu M. Sugimoto
	90DASf01	*Colloquium Ⅰ [mandatory]*	2	Colloquium on contemporary astronomy. Graduate students present and discuss progress of their own research and/or of their fields. (1st year)	All faculty members
	90DASf02	*Colloquium Ⅱ [mandatory]*	2	Colloquium on contemporary astronomy. Graduate students present and discuss progress of their own research and/or of their fields. (2nd year)	All faculty members
	90DASf03	*Colloquium Ⅲ[mandatory]*	2	Colloquium on contemporary astronomy. Graduate students present and discuss progress of their own research and/or of their fields. (3rd year)	All faculty members
	90DASf04	*Colloquium Ⅳ [mandatory]*	2	Colloquium on contemporary astronomy. Graduate students present and discuss progress of their own research and/or of their fields. (4th year)	All faculty members
	90DASf05	*Colloquium Ⅴ [mandatory]*	2	Colloquium on contemporary astronomy. Graduate students present and discuss progress of their own research and/or of their fields. (5th year)	All faculty members
	90DASf06	*Basic Seminar ⅠA*	2	Seminar on basic astronomy textbooks. (First semester of 1st year)	All faculty members
	90DASf07	*Basic Seminar ⅠB*	2		
	90DASf08	*Basic Seminar ⅠC*	2		
	90DASf09	*Basic Seminar ⅡA*	2	Seminar on basic astronomy textbooks. (Second semester of 1st year)	All faculty members
	90DASf10	*Basic Seminar ⅡB*	2		
	90DASf11	*Basic Seminar ⅡC*	2		
	90DASf12	Interdisciplinary Research Ⅰ	4	Seminar on current progress of astronomical sciences (3rd and 4th years).	All faculty members
	90DASf13	Interdisciplinary Research Ⅱ	2	Seminar on current progress of astronomical sciences (4th year).	All faculty members
	90DASf14	*Progress Report [mandatory]*	6	This corresponds to a Master Thesis. Graduate students are asked also to have oral presentations. (2nd year)	All faculty members
	10DASf01	Exercise in Scientific English	2	According to the achievement of respective students, small group execise is given on the presentation in English, conversation and scientific writing.	All faculty members

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Common	20DASf02	Observation Experiment ⅠA	2	Experiment of observation at observatory.	All faculty members
	20DASf03	Observation Experiment ⅠB	2		
	20DASf04	Observation Experiment ⅠC	2		
	20DASf05	Observation Experiment ⅠD	2		
	20DASf06	Observation Experiment ⅡA	1	Experiment of observation at observatory.	All faculty members
	20DASf07	Observation Experiment ⅡB	1		
	20DASf08	Observation Experiment ⅡC	1		
	20DASf09	Observation Experiment ⅡD	1		
	20DASf10	Special Lecture Ⅰ	2	Lecture by visiting professors of National Astronomical Observatory. A specific research area of astronomy is overviewed.	Visiting professor
	20DASf11	Special Lecture Ⅱ	2		
	20DASf12	Special Lecture Ⅲ	2		
	20DASf13	Special Lecture Ⅳ	2		
	20DASf14	Special Lecture Ⅴ	1		All faculty members Visiting professor
	20DASf15	Special Lecture Ⅵ	1		
	20DASf16	Special Lecture Ⅶ	1		
	20DASf17	Special Lecture Ⅷ	1		

Diagonal and underline [mandatory]means graduate students of astronomy department must take these,
Diagonal [choose one] means graduate students of astoronomy department must choose one from a list.